EFFECTS OF THE IOWA WEIGHT TRAINING AND THE ARMY DOZEN ON THE JUMPING ABILITY OF BASKETBALL PLAYERS

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by

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to determine whether the Army Dozen[1] might be as effective as the Iowa Weight Training Program[2] in increasing the jumping height for basketball players.

Justification of the problem. In the present day teaching of basketball, more and more new techniques are being employed. One of these techniques is the building of better rebounders by the use of weights. Tests have been made on weight lifting for improving the jumping height by Edward K. Capen[3] and Edward Chui.[4] It can be said that some type of exercise to build the muscles of the body used in

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[1]United States Department of the Army, Physical Conditioning: TM 21-200 (Washington: Government Printing Office, 1957), pp. 78-97.

[2]Frank O'Connor and Frank Sills, "Heavy Resistance Exercises for Basketball Players," Athletic Journal, XXXVI (June, 1956), 6-7.

[3]Edward K. Capen, "The Effect of Systematic Weight Training on Power, Strength, and Endurance," The Research Quarterly, XXI (March, 1950), 83-93.

[4]Edward Chui, "The Effect of Systematic Weight Training on Athletic Power," The Research Quarterly, XXI (October, 1950), 188-94.

basketball is better than no exercise at all. The aforementioned men tested weight lifting with one group and different physical education activities with the second group.

Weight lifting is both expensive and time consuming. It would be feasible to have a program that takes less money and time. It also appears that it would be much better to develop the entire body of the players than to develop only certain special groups of muscles for the purpose of basketball.

It can be seen by the testing procedure that any number of men could be exercised with the Army Dozen[1] in the same period of time that it takes one man to do the Iowa Weight Program.[2]

II. TERMINOLOGY

The following terms are peculiar to this study.

The Army Dozen. The Army Dozen is a group of twelve exercises with the purpose of developing the entire body. They are as follows: High Jumper, Bend and Reach, Squat Thrust, Rowing Exercise, Squat Bender, Four-Count Pushups, Side Bender, Body Twist, Squat Jumper, Trunk Twister,

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[1] Army, loc. cit. [2] O'Connor and Sills, loc. cit.

Stationary Run, and Eight-Count Pushups.[1] (See Appendix C.)

The Iowa Weight Lifting Program. The Iowa Weight Lifting Program is a group of seven exercises with the purpose of developing a special few muscles. These exercises are as follows: Finger and Wrist Curls, Forearm Curls, Sideward Raise, Overhead Extension, Forward Raise, Heel Raise, and Walking Squat.[2] (See Appendix D.)

Jumping height. The jumping height is the height a player can reach with his hand by taking one step and jumping as high as he can.

Week of exercise. A week of exercise is defined as a period of three days, Monday, Wednesday, and Friday, on which the two groups were given the exercises.

Initial jumps. Initial jumps, a series of twenty jumps, ten with the right hand and ten with the left, were taken prior to the exercise period of six weeks.

First jumps. First jumps, a series of twenty jumps, followed the first week of exercises and were taken on the last day of exercise for the week.

Second jumps. Second jumps, a series of twenty

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[1] Army, loc. cit.

[2] O'Connor and Sills, loc. cit.

jumps, followed the second week of exercise and were taken on the last day of the exercise week.

Third jumps. Third jumps, a series of twenty jumps, followed the third week of exercise and were taken on the last day of the exercise week.

Fourth jumps. Fourth jumps, a series of twenty jumps, followed the fourth week of exercise and were taken on the last day of the exercise week.

Fifth jumps. Fifth jumps, a series of twenty jumps, followed the fifth week of exercise and were taken on the last day of the exercise week.

Sixth jumps. Sixth jumps, a series of twenty jumps, followed the sixth week of exercise and were taken on the last day of the exercise week.

III. PROCEDURE

A system had to be established so as to put both groups on an equal basis for the testing purposes. As the two groups of exercises were of different nature, it was determined that a time basis would be best. In establishing the time, the seven Iowa Weight Program[1] exercises were

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[1] Ibid.

used.

Two men were used to start this pre-testing stage. One man was tested first to determine the amount of weight he could handle for each exercise in the Iowa Weight Program[1] for fifteen repetitions. He then was timed, moving at a normal pace, to find the length of time that it took him to finish all exercises. A series of five tests was administered, taking the average time of each exercise.

The second man was tested on the number of repetitions for each exercise of the Army Dozen[2] that would correspond to the Iowa Weight Program[3] on the time basis. It was found that seven repetitions of each exercise of the Army Dozen[4] were of equal time. A series of five tests was administered to substantiate the time element for the two men.

Following the administering of the two initial tests, eight men who had the time to work on this test were chosen. Two men each from the ninth grade through the twelfth were used, trying to get a cross section of the basketball squad. One man from each grade was placed in each of the two exercise groups.

After each man was tested for the amount of weight he

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[1] Ibid.

[2] Army, loc. cit.

[3] O'Connor and Sills, loc. cit.

[4] Army, loc. cit.

could handle on the Iowa Weight Program[1] and the men on the exercises were orientated to the Army Dozen,[2] the tests were run for a five-day period to substantiate the time element. The time for each man was taken on all five days. The average time for each group was in agreement with the previous two-man test.

Two schools were used in the test, Urbandale and Altoona. At both schools each class was alphabetized. The first man of the twelfth grade was put on weights, the second man on exercises, and alternating through each squad until every man was placed either on weights or exercises.

After dividing the men into the two groups, the men that were on weights were tested to determine how much weight they could lift with effort for twelve repetitions. If they could lift the weight for fifteen repetitions, the weight was increased until it was an effort to achieve the twelve repetitions. If the weight was too much, it was decreased.

Following the orientation of the weights and the exercises, the men were tested to find how high they could jump. This was achieved by taking the average height of ten jumps each hand for each man. The initial jumps were taken before the exercise period of six weeks started.

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[1] O'Connor and Sills, loc. cit. [2] Army, loc. cit.

The weight and exercise programs were conducted according to the Iowa Weight Program,[1] in re, three times a week for a six-week period. Each man was tested at the end of each week period by taking the average of ten jumps per hand. The average of the twenty jumps was then tabulated for each man.

IV. LIMITATIONS

The Iowa Weight Program[2] as set up is to be administered six weeks prior to the actual starting of the basketball practice. Due to the fact that some of the men that participated in basketball also participated in football, it was impossible to start this test at the time specified by the Iowa Program. The test was started at both Urbandale and Altoona the first week of basketball practice.

Another factor limiting this test was space. The facilities at Urbandale and Altoona are very limited and crowded. The test was administered to basketball players as the physical education classes were not scheduled to meet enough times a week.

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[1] O'Connor and Sills, loc. cit. [2] Ibid.

CHAPTER II

REVIEW OF LITERATURE

When man competes against man, the stronger individual possesses an advantage. McCloy and Young have reported that men who score high in strength also score high in general athletic ability.[1] Hence, one of the goals in athletics is to increase the strength of the participants.

Morehouse and Rasch stated that strength may be defined as the ability of a muscle to exert force against a resistance. The ability to exert strength depends on the actions and interactions of such factors as: (1) the amount of muscle tissue, (2) body configuration, (3) muscle quality, (4) muscle innervation, (5) environmental stimuli, (6) skill, (7) external leverage, (8) internal leverage, (9) neuromuscular conditioning, (10) nutritive state of the muscle fibers, (11) tension of the muscle, and (12) age.[2]

Out of the foregoing factors influencing strength, the athlete may work to increase the amount of his muscle

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[1]Charles H. McCloy and Norma D. Young, Tests and Measurements in Health and Physical Education (New York: Appleton Century Crofts, Inc., 1954), p. 142.

[2]Laurence E. Morehouse and Philip J. Rasch, Scientific Basis of Athletic Training (Philadelphia: W. B. Saunders Company, 1958), pp. 108-9.

tissue, neuromuscular adaptations and skill.[1] Information is lacking on the degree to which human skeletal muscle can be made to grow, how much will be retained after cessation of exercise, the best type of exercise to promote muscle growth, or the effect of exercise on growth in general.[2]

It is generally agreed that strength increases when repetitive exercise is performed against heavy resistance. Power is a factor that is statistically dependent upon, and correlated with, the factors of strength and velocity.[3]

> Although in theoretical physics there is no limitation to either force or velocity, in the human body velocity is limited by the resistance of muscular tissue and by the fact that the speed of relaxation of muscles functioning antagonistically is less than the speed of contraction of muscles functioning agonistically. Up to the limit imposed by these restraining factors, increases in strength result in increases in velocity. Beyond this limit, an increase in strength results in little or no increase in velocity.[4]

Neither physical play nor most sports activities adequately meet the need for reserve strength, endurance, and flexibility, and prior to World War II trainers of athletic teams were almost unanimously opposed to the use of progressive resistance exercises (weight training).[5] The

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[1] Ibid., p. 110.

[2] J. N. Tanner, "The Effects of Weight-Training on Physique," American Journal of Physical Anthropology, X (December, 1952), 427.

[3] McCloy and Young, op. cit., p. 66.

[4] Ibid.

[5] Morehouse and Rasch, op. cit., p. 110.

fear of the trainers toward weight training was that it would make the participants "muscle-bound"[1] and slow.

Coaches have responded to weight training for basketball players with varied views. The major objection to heavy resistance exercises for basketball players is that increased strength may tighten the muscles used in shooting the ball and thus the players may lose their scoring ability. Another related objection is that the heavy resistance would cause "muscle-boundness" in the arm and shoulder girdle.[2] O'Connor and Sills in administering the Iowa Program did not report any ill effects upon the basketball players.[3]

O'Connor and Sills encouraged coaches who use heavy resistance exercises to incorporate them into their regularly scheduled workouts. The weight training should not be separated from the practice of sports skills.[4] However, Morehouse and Rasch state that ordinarily a weight program is not attempted during the time that an athlete is in active training for a sport. They further state that the energy output demanded by the two training programs is

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[1] A shortening of the muscles or a muscle of the body due to overworking.

[2] R. L. Wickstrom, "Post-Season Weight Training for Basketball Players," Athletic Journal, XXXIX (April, 1959), 38.

[3] O'Connor and Sills, loc. cit.

[4] Ibid.

usually too high to be sustained and the athlete will become fatigued and will lose weight and strength instead of gaining them.[1] The theory is advanced by Ewing that, while intensive work with weights should probably be limited to the off-season, some athletes seem to retain their strength better if they continue a moderate workout or two each week throughout the season.[2]

Dukelow, following review of medical literature relating to this subject, had this to say:

> Generally, these [papers] discuss controlled observations and research studies which show that at the time exercise is performed it increases muscle volume, . . . and volume of respiration. They tell about the effect on the nervous system, digestive system, the excretory system, the circulatory system, the musculoskeletal system, and nearly everything else in the body.
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> However, these investigators rarely say whether the observed phenomena are beneficial, harmful, or of no consequence.[3]

While such studies may be questioned and their limitations pointed out, the fact remains that the case for exercise must be based on sounder grounds than the potential value of temporary physiological adjustments or its training

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[1]McCloy and Young, op. cit., p. 117.

[2]George W. Ewing, "Exercise by the Pound," Athletic Journal, XXXIX (September, 1958), 87.

[3]D. A. Dukelow, "A Doctor Looks at Exercise and Fitness," Journal of Health, Physical Education and Recreation, XXVIII (September, 1957), 24.

effects for better physical performance.[1]

With all the tests that have been studied to substantiate the point that a weight training program is beneficial rather than detrimental in increasing the strength of athletes in a given sport, there are some people who have not completely accepted this idea. Hence, the writer has undertaken another approach to strengthening the body for athletics which could be carried over to everyday life easier than a weight program.

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[1]Fred V. Hew and Allan J. Ryan, "The Contributions of Physical Activity to Physical Health," The Research Quarterly of the American Association for Health, Physical Education and Recreation, XXXI (May, 1960), 263.

CHAPTER III

REPORT OF THE STUDY

In this chapter the investigator presents data concerning the mean jumps of each individual man in both the weight program and exercise program and, also, the mean jumps of both groups.

The Altoona and Urbandale High Schools' basketball squads were the source for the data obtained in this study. The grades used from each school included nine, ten, eleven, and twelve. There were fifty-one boys that started the tests. Twenty-six boys were on weights and twenty-five on exercises. Two boys on weights dropped basketball and one on exercises was sick before the tests were completed. This left twenty-four boys in each group.

Following the orientation of both groups, as stated in Chapter I, both groups were given the initial test jumps to determine the mean height to be compared to the mean height at the end of the six-week testing period.

A chart was placed on the wall with inches and half-inches marked. Two men who had received instruction and practice on reading the chart were placed on stepladders on either side of the chart. They both read the jump and recorded the height that was attained by each jump.

A week of exercising was a three-day period, Monday

Wednesday, and Friday. On Friday each man would take his series of twenty jumps, ten each hand.

Table I, which was arranged in numerical order according to the mean increase, shows the mean for the initial jump, the sixth jump, and the increase for each man of both the exercise and weight groups.

TABLE I

MEANS OF THE INDIVIDUALS INITIAL JUMPS, SIXTH JUMPS, AND INCREASE OF THE EXERCISE AND WEIGHT GROUPS

EXERCISE GROUP				WEIGHT GROUP			
Number of Jumper	Initial Jump	Sixth Jump	Increase	Number of Jumper	Initial Jump	Sixth Jump	Increase
1	104.86	110.45	5.59	1	98.74	102.49	3.75
2	111.89	116.93	5.04	2	109.53	112.85	3.22
3	108.13	112.22	4.09	3	106.62	109.81	3.19
4	114.04	117.98	3.94	4	106.65	109.69	3.04
5	117.69	121.48	3.79	5	108.46	111.46	3.00
6	106.00	109.78	3.78	6	106.76	109.75	2.99
7	108.20	111.80	3.60	7	112.96	115.92	2.96
8	109.86	113.34	3.48	8	107.39	110.35	2.96
9	105.06	107.80	2.74	9	104.58	107.53	2.95
10	109.76	112.43	2.67	10	107.03	109.94	2.91
11	113.49	116.14	2.65	11	109.65	112.25	2.60
12	106.48	109.01	2.53	12	112.76	115.34	2.58
13	110.43	112.95	2.52	13	102.18	104.74	2.56
14	106.97	109.40	2.43	14	107.44	109.94	2.50
15	105.85	108.23	2.38	15	108.40	110.86	2.46
16	109.45	111.76	2.31	16	103.56	106.02	2.46
17	111.20	113.40	2.20	17	108.12	110.45	2.33
18	105.31	107.48	2.17	18	108.02	109.96	1.94
19	106.37	108.48	2.11	19	107.87	109.63	1.76
20	118.73	120.80	2.07	20	103.35	105.05	1.70
21	108.04	110.08	2.04	21	118.70	120.38	1.68
22	107.18	108.96	1.78	22	107.48	109.01	1.53
23	109.19	110.74	1.55	23	108.60	109.99	1.39
24	106.98	108.16	1.18	24	103.43	104.49	1.06

The range of the mean on the initial jumps for the exercise group is from 104.86 inches to 118.73 inches. The range on the sixth jumps is from 107.48 inches to 121.48 inches, and on the increase is from 1.18 inches to 5.59 inches. The reliability of the difference of the initial and sixth jumps was 1.09.

The range of the mean on the initial jumps, the sixth jumps, and the increase for the weight group is as follows: initial jump is 98.74 inches to 118.70 inches, sixth jump is 102.49 inches to 120.38 inches, and the increase is 1.06 inches to 3.76 inches. The reliability of the difference of the initial and sixth jumps was 1.08.

A correlation was run on four men, but it was deemed not essential to the study.

The scores of each man's jumps from which Table I has been recorded are located in Appendix A.

It is interesting to note from Table I the exercise group had six men that improved more than the top man of the weight group. Equal interest should also be given to the men at the bottom of each group. At the bottom there are seven men in the weight group that improved less than two inches and only three in the exercise group.

Table II shows the mean scores of the initial and sixth jumps and the increase of both the weight and exercise groups as a whole. The exercise group improved 2.74 inches

and the weight group improved 2.58 inches.

TABLE II

MEANS OF THE INITIAL JUMPS, SIXTH JUMPS AND INCREASE OF THE EXERCISE AND WEIGHT GROUPS AS A WHOLE

EXERCISE GROUP			WEIGHT GROUP		
Initial Jumps	Sixth Jumps	Increase	Initial Jumps	Sixth Jumps	Increase
109.32	112.06	2.74	107.36	109.94	2.58

As is indicated by both tables, the exercise group has attained the same purpose as the weight program.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

The purpose of this study was to determine whether the exercise group could achieve the same goal as the weight lifting group in regard to improving the jumping height of basketball players.

The procedures followed in this study were (1) to review the literature in the area, (2) to investigate the data obtained from the testing programs, and (3) to summarize the material and give conclusions and recommendations.

The data secured by means of the testing programs was organized and presented in Chapter III. The results indicated that the exercise program achieved the goal that was sought as is indicated by the mean increase. The mean increase of the exercise group was 2.74 inches with the reliability of the difference of the initial mean and the sixth mean being 1.09. The mean increase of the weight group was 2.58 inches with the reliability of the difference of the initial mean and the sixth mean being 1.08.

II. CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information obtained in this

study, the following conclusions are presented:

1. The exercise group surpassed the weight group on the average in increasing the jumping height. However, the difference in increase is not as important as is the fact that the exercise group obtained the goal as described in the statement of the problem.
2. The greatest increase by an individual of either group was obtained by the exercise group with seven men being above the top weight man.
3. The amount of time consumed in performing the exercises by the exercise group was much less than the weight group. The time consumed in performing the actual exercises of both groups was five minutes. Much more time was used by the weight group while changing the different weight for each exercise.
4. Money could be saved by the use of exercises and this money could be utilized for a better all-round program.
5. Many of the players on weights complained that the weights tended to hinder them in shooting the basketball when the exercises were administered prior to the practice period. However, this sensation would pass in ten to fifteen minutes after the exercise period.

The results of this study cannot be considered conclu-

sive. The investigator recommends that this study be used as a guide in making similar studies in football, track, wrestling, and any other area in the coaching field where weights are used to improve the production of an athlete. The investigator further recommends that this study be used as a guide in making similar studies either to substantiate other previous tests or to create new trends in the coaching field.

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APPENDIXES

APPENDIX A

INITIAL AND SIXTH JUMPS OF THE EXERCISE GROUP

Number of Jumper 1

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	103.0	113.0	109.0
2	108.0	104.0	113.0	108.0
3	108.0	102.0	111.0	108.0
4	109.0	102.0	112.0	110.0
5	106.0	102.0	111.0	111.0
6	107.0	105.0	111.0	109.0
7	108.0	104.0	112.0	109.0
8	106.0	103.0	111.0	108.0
9	103.0	102.0	111.0	109.0
10	104.0	103.0	111.0	108.0

Number of Jumper 2

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	113.5	112.0	118.0	118.0
2	113.0	110.0	118.0	117.0
3	112.0	111.0	117.0	114.0
4	111.0	110.0	116.5	118.5
5	113.0	111.0	118.0	118.5
6	112.5	111.5	117.0	116.0
7	112.0	112.0	117.0	116.5
8	111.5	116.5	117.0	115.0
9	110.0	112.0	117.0	116.0
10	110.5	112.5	116.5	113.0

Number of Jumper 3

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	110.0	109.0	111.0	112.0
2	111.0	106.0	111.0	112.0
3	111.0	105.0	114.0	113.0
4	112.0	104.0	115.0	112.0
5	112.0	108.0	112.0	111.0
6	111.0	104.0	114.0	112.0
7	111.0	107.0	113.0	112.0
8	110.0	103.0	113.0	111.0
9	110.0	105.0	112.0	108.0
10	110.0	104.0	113.0	113.0

Number of Jumper 4

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	113.0	116.0	118.0	117.0
2	112.0	115.0	118.5	117.0
3	114.0	114.5	118.5	118.0
4	113.0	113.0	118.0	115.0
5	114.0	115.0	118.0	118.0
6	115.0	114.5	118.0	117.0
7	112.0	115.5	118.5	119.0
8	114.0	116.0	119.0	119.0
9	113.0	114.5	119.0	118.0
10	112.0	114.0	118.0	118.0

EXERCISE GROUP (continued)

Number of Jumper 5

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	118.5	115.0	121.0	119.0
2	119.0	114.0	122.0	121.0
3	118.5	117.5	121.0	122.0
4	119.5	116.0	122.0	121.0
5	119.5	115.0	122.0	123.0
6	120.0	116.0	121.0	122.0
7	120.0	115.0	122.5	121.0
8	120.0	116.0	120.0	122.0
9	120.0	117.0	121.0	122.5
10	119.5	116.5	120.0	123.0

Number of Jumper 6

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	105.0	96.5	110.0	110.0
2	105.0	106.0	110.0	111.0
3	106.5	106.5	110.0	110.0
4	107.0	106.0	110.0	110.0
5	107.0	106.5	109.0	111.0
6	106.5	106.0	110.0	109.5
7	107.5	106.0	109.0	110.0
8	108.0	106.0	110.0	107.5
9	106.5	105.5	110.0	110.0
10	107.0	107.0	110.5	108.0

Number of Jumper 7

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	107.5	111.0	113.0
2	106.0	108.0	110.0	113.0
3	106.0	108.0	110.0	112.0
4	108.0	109.0	110.0	114.0
5	107.5	109.0	112.0	111.0
6	107.0	108.5	112.0	113.0
7	108.5	108.5	113.0	111.0
8	108.5	108.5	112.0	112.0
9	109.5	108.5	111.0	113.0
10	110.0	110.5	111.0	111.0

Number of Jumper 8

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	111.0	113.0	114.0
2	110.0	110.0	114.0	114.0
3	108.0	108.0	114.0	114.0
4	108.0	110.0	114.0	114.0
5	110.0	111.0	114.0	113.0
6	111.0	112.0	113.0	112.0
7	112.0	109.0	114.0	113.0
8	111.0	109.0	112.0	112.0
9	110.0	110.0	114.0	112.0
10	110.0	109.0	114.0	114.0

EXERCISE GROUP (continued)

Number of Jumper 9

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	104.0	108.0	108.0	107.0
2	105.0	106.0	110.0	106.0
3	105.0	106.0	109.0	106.0
4	105.0	106.0	109.0	107.0
5	104.5	106.0	109.0	107.0
6	104.0	105.0	108.0	105.0
7	105.0	104.0	108.0	108.0
8	105.5	104.0	109.0	107.0
9	104.0	104.0	108.0	106.0
10	105.0	104.0	108.0	106.0

Number of Jumper 10

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	111.0	109.0	114.0	111.5
2	112.0	108.0	114.5	115.0
3	109.0	109.0	112.5	114.5
4	110.5	110.0	112.5	112.0
5	110.5	108.0	112.0	110.0
6	111.0	108.0	112.0	110.5
7	112.0	109.0	112.0	111.0
8	112.0	109.0	114.5	110.0
9	110.0	109.5	112.5	111.0
10	109.0	108.0	112.0	110.5

Number of Jumper 11

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	114.0	115.0	118.0	115.0
2	115.0	113.0	118.0	115.0
3	114.0	113.0	117.0	115.0
4	115.0	113.0	118.0	114.0
5	114.0	114.0	118.0	114.5
6	113.0	113.0	117.0	115.0
7	114.0	113.0	118.0	114.0
8	113.0	112.0	118.0	114.0
9	114.0	112.0	118.0	115.0
10	113.0	113.0	117.0	114.0

Number of Jumper 12

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.0	106.5	110.0	109.0
2	107.5	107.5	110.0	110.0
3	107.5	106.5	109.0	109.0
4	106.0	105.0	109.0	110.0
5	106.0	106.5	109.0	108.0
6	107.0	105.0	109.0	109.0
7	107.5	105.5	108.0	108.0
8	107.5	107.0	109.0	109.5
9	107.5	103.0	109.0	109.0
10	107.5	105.5	108.0	108.0

EXERCISE GROUP (continued)

Number of Jumper 13

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	111.0	108.5	113.0	112.5
2	111.5	109.0	112.5	113.0
3	111.5	109.5	114.5	112.5
4	112.0	109.5	113.5	113.0
5	111.5	108.5	113.0	113.5
6	111.0	109.5	114.5	113.0
7	111.5	110.0	112.5	112.5
8	111.5	110.0	112.5	111.0
9	111.5	110.5	113.5	112.0
10	111.0	109.0	114.5	112.0

Number of Jumper 14

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.0	107.5	110.0	110.0
2	108.5	106.5	110.0	110.0
3	107.0	106.5	110.0	109.5
4	107.0	107.0	109.5	109.5
5	107.0	106.5	109.5	109.5
6	107.5	107.0	109.5	109.0
7	106.5	106.5	109.0	109.0
8	107.0	106.0	109.0	108.5
9	107.0	106.5	109.0	109.5
10	107.0	106.0	109.0	109.0

Number of Jumper 15

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	103.0	105.0	108.0	109.0
2	105.5	105.0	109.0	109.0
3	104.0	107.0	108.0	110.0
4	104.0	106.0	108.0	109.0
5	104.0	108.0	109.0	107.0
6	105.0	105.0	108.0	108.0
7	105.0	107.0	107.0	108.0
8	106.0	107.0	107.0	109.0
9	107.0	108.0	108.0	108.0
10	106.0	108.0	108.0	108.0

Number of Jumper 16

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	109.5	109.0	113.0	112.0
2	109.5	109.0	112.0	111.5
3	110.0	109.5	111.0	111.5
4	108.5	109.0	113.0	111.0
5	110.0	109.0	112.0	111.0
6	111.0	110.0	112.5	111.5
7	110.5	109.0	112.5	110.5
8	110.0	107.5	112.0	112.0
9	110.0	109.0	112.0	111.5
10	109.5	109.0	112.5	110.5

EXERCISE GROUP (continued)

Number of Jumper 17

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	113.0	111.0	114.0	113.0
2	112.0	110.0	114.0	112.0
3	112.0	112.0	115.0	113.0
4	111.0	111.0	115.0	113.0
5	111.0	109.0	114.0	112.0
6	110.0	111.0	114.0	113.0
7	111.0	110.0	113.0	113.0
8	113.0	112.0	115.0	113.0
9	112.0	110.0	114.0	112.0
10	112.0	110.0	114.0	112.0

Number of Jumper 18

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	105.0	105.0	107.0	108.0
2	105.5	105.0	108.0	108.0
3	106.0	103.0	109.0	108.0
4	105.0	104.0	108.0	108.0
5	105.0	105.0	108.0	108.0
6	105.5	106.0	107.0	107.0
7	106.0	106.0	107.0	108.0
8	103.5	106.0	107.0	107.0
9	106.0	106.0	107.0	107.0
10	106.5	106.0	107.0	106.0

Number of Jumper 19

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.0	106.0	108.0	109.0
2	107.0	105.5	109.0	109.5
3	105.5	106.0	109.0	109.0
4	106.0	107.0	108.0	108.0
5	106.0	105.0	108.5	108.0
6	106.5	105.0	109.0	109.0
7	107.0	106.0	108.0	108.0
8	106.5	105.0	109.0	108.0
9	106.5	106.5	108.0	108.0
10	105.0	105.0	108.0	108.0

Number of Jumper 20

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	118.0	120.0	122.5	119.0
2	119.0	118.5	121.5	120.5
3	119.0	118.0	121.5	120.0
4	119.0	118.0	121.0	120.5
5	119.5	117.0	121.5	121.5
6	119.5	118.0	121.5	119.5
7	119.5	120.0	123.0	119.0
8	120.0	116.5	122.0	119.5
9	119.5	117.5	121.0	119.5
10	119.5	118.0	121.0	120.0

EXERCISE GROUP (continued)

Number of Jumper 21

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	108.0	112.0	109.0
2	110.0	106.0	112.0	108.0
3	109.0	107.0	112.0	109.0
4	108.0	107.0	110.0	109.0
5	109.0	107.0	111.0	109.0
6	109.0	107.0	111.0	109.0
7	109.0	106.0	112.0	109.0
8	110.0	106.0	111.0	108.0
9	109.0	109.0	110.0	109.5
10	108.0	108.0	111.0	109.0

Number of Jumper 22

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.5	107.5	109.0	109.5
2	108.0	107.0	110.0	109.0
3	107.5	107.5	109.0	109.0
4	107.0	107.5	108.5	108.0
5	108.0	104.5	110.0	109.5
6	108.0	107.0	109.5	108.0
7	108.5	106.5	109.0	107.5
8	107.5	107.0	109.5	109.0
9	108.0	104.5	109.5	108.5
10	107.5	107.5	109.5	108.0

Number of Jumper 23

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	107.0	111.0	111.0
2	110.0	109.0	112.0	112.0
3	110.5	109.0	110.0	112.0
4	110.5	109.0	111.0	111.0
5	109.5	110.0	110.0	110.0
6	108.5	109.0	111.0	111.0
7	108.0	109.0	110.0	110.0
8	109.5	110.0	110.0	110.0
9	108.5	109.0	111.0	110.0
10	109.5	110.0	111.0	110.0

Number of Jumper 24

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.5	106.0	109.0	108.0
2	107.0	105.5	108.5	107.5
3	106.0	105.5	109.0	108.0
4	109.0	105.0	108.0	107.5
5	107.5	107.5	108.0	108.0
6	108.0	107.0	108.0	108.0
7	106.0	108.0	108.0	108.0
8	107.5	107.0	108.0	108.0
9	106.0	107.0	109.0	108.0
10	107.5	107.0	109.5	108.0

APPENDIX B

INITIAL AND SIXTH JUMPS OF THE WEIGHT GROUP

Number of Jumper 1

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	99.0	99.0	104.0	102.0
2	99.5	99.0	103.5	102.0
3	99.0	97.5	102.0	102.0
4	99.5	98.5	103.0	103.0
5	99.0	98.5	103.0	102.0
6	99.0	99.0	103.0	103.0
7	99.0	98.5	103.5	102.0
8	99.0	98.5	102.0	101.5
9	99.0	99.0	101.5	102.0
10	96.5	99.5	102.5	103.0

Number of Jumper 2

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	110.0	110.0	114.0	112.0
2	111.0	108.0	113.0	112.5
3	110.0	108.0	114.0	110.0
4	111.0	109.0	115.0	111.0
5	110.0	109.0	115.0	113.0
6	110.0	108.0	113.5	112.0
7	110.0	109.0	114.0	110.0
8	110.0	109.0	113.0	110.0
9	110.0	110.0	114.0	112.0
10	110.0	108.0	114.0	111.0

Number of Jumper 3

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	106.5	109.0	110.5
2	107.5	106.0	111.0	110.0
3	107.5	106.5	111.5	110.5
4	107.5	105.5	110.0	111.0
5	107.5	105.5	109.5	109.0
6	107.0	106.5	110.0	109.5
7	108.0	106.0	110.0	108.5
8	107.0	106.0	109.5	108.0
9	106.5	104.0	109.0	110.0
10	106.5	107.0	110.0	110.0

Number of Jumper 4

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	107.0	110.0	110.0
2	108.0	109.0	110.0	109.0
3	105.0	108.0	109.0	109.0
4	108.0	108.0	109.0	109.0
5	107.0	108.0	110.0	110.0
6	105.0	105.0	110.0	110.0
7	106.0	107.0	110.0	109.0
8	107.0	105.0	111.0	110.0
9	106.0	106.0	110.0	110.0
10	105.0	106.0	110.0	110.0

WEIGHT GROUP (continued)

Number of Jumper 5

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	108.5	112.0	109.0
2	108.0	110.0	111.0	111.0
3	108.0	109.5	113.0	112.0
4	107.0	109.0	113.0	111.0
5	108.5	108.0	112.0	111.0
6	108.5	108.0	113.0	110.0
7	108.5	109.5	113.0	110.0
8	108.0	108.5	113.0	109.0
9	110.0	109.0	112.0	110.0
10	107.0	110.0	113.0	111.0

Number of Jumper 6

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	106.0	108.0	111.0	108.0
2	108.0	106.0	112.0	107.0
3	108.0	106.0	112.0	108.0
4	107.0	107.0	111.0	107.0
5	107.0	105.0	110.0	108.0
6	107.0	106.0	112.0	108.0
7	108.0	108.0	112.0	108.0
8	107.0	105.0	111.0	108.0
9	108.0	106.0	110.0	108.0
10	107.0	105.0	111.0	107.5

Number of Jumper 7

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	114.5	113.5	113.0	116.0
2	114.0	113.0	117.0	116.0
3	111.0	113.0	116.5	116.0
4	111.0	113.0	116.0	116.0
5	114.5	111.0	116.5	115.5
6	110.5	112.5	117.0	114.5
7	113.5	112.5	116.5	115.0
8	114.0	112.0	116.0	116.0
9	114.0	114.0	116.0	115.5
10	114.5	113.0	116.0	116.5

Number of Jumper 8

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	106.0	106.0	111.0	110.5
2	107.5	106.0	111.0	111.5
3	107.5	106.0	112.0	111.5
4	108.0	108.0	110.0	108.5
5	108.5	107.0	110.5	109.0
6	108.0	107.5	111.5	111.0
7	107.0	108.0	110.0	110.0
8	108.0	107.5	111.0	109.5
9	108.0	107.0	111.0	109.0
10	109.0	107.0	110.0	108.5

WEIGHT GROUP (continued)

Number of Jumper 9

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	104.0	104.0	109.0	107.5
2	105.5	104.5	108.0	108.0
3	105.0	102.5	108.0	107.5
4	105.0	104.5	108.0	106.5
5	105.0	103.0	108.0	106.5
6	105.0	104.5	107.5	106.5
7	105.5	104.0	107.5	109.0
8	106.0	103.5	107.0	107.5
9	106.0	104.0	107.0	108.0
10	105.5	104.5	107.0	107.0

Number of Jumper 10

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.0	105.0	111.0	109.0
2	108.0	106.0	110.0	109.0
3	108.0	107.0	110.0	111.0
4	108.0	106.0	111.0	110.0
5	107.5	106.0	109.0	110.0
6	108.0	107.0	110.0	111.0
7	107.0	106.0	110.0	109.0
8	107.0	107.0	110.0	109.0
9	107.5	106.0	111.0	109.0
10	108.5	108.0	110.0	109.0

Number of Jumper 11

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	110.0	109.0	114.5	113.5
2	110.5	106.5	112.5	112.0
3	110.5	108.0	112.5	112.0
4	111.5	108.5	112.5	112.0
5	110.0	108.0	113.0	112.0
6	110.5	108.0	112.0	111.0
7	110.5	108.0	112.0	111.0
8	110.0	109.0	112.5	111.0
9	111.0	109.0	113.0	110.5
10	111.0	109.5	112.0	109.5

Number of Jumper 12

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	115.0	112.5	114.5	116.0
2	113.5	113.0	115.0	116.5
3	113.5	112.5	115.5	115.0
4	114.0	112.5	115.5	115.0
5	113.0	112.0	114.5	115.5
6	113.0	111.0	115.5	115.5
7	113.0	112.5	115.0	115.0
8	112.5	112.0	116.0	115.0
9	113.0	111.0	116.0	115.5
10	113.0	111.5	115.0	115.5

WEIGHT GROUP (continued)

Number of Jumper 13

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	104.0	103.0	104.0	103.0
2	104.0	103.0	103.5	104.5
3	104.0	102.5	104.0	105.0
4	104.0	100.0	104.5	105.0
5	103.0	102.0	105.0	105.0
6	102.0	99.0	105.5	105.5
7	103.0	98.0	106.5	105.0
8	101.5	99.0	105.5	105.0
9	104.0	102.0	105.0	104.0
10	103.0	102.0	105.5	103.5

Number of Jumper 14

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	107.0	110.0	109.0
2	108.0	107.0	111.0	110.0
3	108.0	106.0	110.0	110.0
4	109.0	106.0	110.0	110.0
5	108.0	107.0	110.0	109.0
6	108.0	108.0	110.0	109.0
7	108.0	107.0	111.0	110.0
8	107.0	107.0	110.0	110.0
9	107.0	107.0	110.0	109.0
10	109.0	107.0	110.0	110.0

Number of Jumper 15

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	110.0	107.0	112.0	110.0
2	110.0	108.0	112.0	111.0
3	110.0	108.0	112.5	110.0
4	110.0	107.0	112.0	109.0
5	109.0	107.0	113.0	110.0
6	109.0	106.0	112.0	110.0
7	110.0	107.0	111.0	111.0
8	109.0	107.0	110.0	111.0
9	109.0	107.0	112.0	109.0
10	110.0	107.0	112.0	110.0

Number of Jumper 16

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	102.0	104.0	105.0	107.0
2	103.0	105.0	104.0	106.0
3	103.0	105.0	105.0	106.0
4	102.0	105.0	105.0	108.0
5	102.0	105.0	105.0	107.0
6	102.0	105.0	106.0	106.0
7	103.0	105.0	106.0	108.0
8	102.0	105.0	106.0	106.0
9	102.0	105.0	105.0	106.0
10	101.0	105.0	106.0	107.0

WEIGHT GROUP (continued)

Number of Jumper 17

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	107.0	111.0	109.0
2	110.0	107.0	111.0	109.0
3	110.0	108.0	112.0	109.0
4	108.0	107.0	112.0	108.0
5	109.0	106.0	111.0	109.0
6	108.0	108.0	111.0	109.0
7	110.0	107.0	113.0	108.0
8	110.0	107.0	112.0	110.0
9	109.0	107.0	112.0	109.0
10	110.0	106.0	111.0	109.0

Number of Jumper 18

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	107.5	108.5	110.5	110.0
2	108.0	106.5	110.5	110.5
3	108.0	107.5	111.0	111.0
4	109.0	108.0	110.5	110.5
5	109.5	108.5	109.5	109.0
6	109.0	107.5	110.0	109.0
7	109.5	106.0	109.5	109.5
8	108.0	107.5	110.0	108.5
9	109.5	106.5	110.0	110.0
10	110.0	106.5	110.5	109.5

Number of Jumper 19

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.5	107.0	110.0	110.0
2	108.5	107.5	110.0	110.0
3	108.5	107.0	109.0	110.0
4	108.0	108.0	111.5	109.0
5	107.0	107.0	110.5	109.0
6	108.0	108.5	109.5	109.0
7	109.0	107.5	109.5	109.5
8	108.0	107.5	109.0	109.5
9	108.5	108.5	109.5	109.0
10	108.0	107.0	110.0	109.0

Number of Jumper 20

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	104.0	99.5	106.0	104.0
2	104.0	100.5	104.0	103.0
3	104.5	101.0	103.0	104.0
4	104.5	101.5	106.0	105.0
5	104.5	101.5	106.0	103.0
6	104.5	103.0	106.5	104.0
7	104.0	103.0	108.5	104.0
8	104.5	103.5	106.0	103.5
9	104.5	103.5	106.0	104.5
10	104.5	102.5	106.0	104.0

WEIGHT GROUP (continued)

Number of Jumper 21

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	118.5	118.0	119.5	118.0
2	121.0	117.0	122.5	120.0
3	118.5	118.0	120.5	120.5
4	119.0	118.5	120.5	119.0
5	118.0	119.0	119.5	120.0
6	118.5	119.5	119.5	121.0
7	117.0	119.0	120.0	119.0
8	117.0	119.5	121.0	119.5
9	117.0	120.0	120.0	119.0
10	116.5	120.5	121.5	120.0

Number of Jumper 22

Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	107.0	108.0	109.0
2	108.0	107.0	110.0	108.0
3	109.0	106.0	110.0	108.0
4	108.0	106.0	110.0	108.0
5	108.0	106.0	111.0	109.0
6	108.0	106.0	108.0	107.0
7	108.0	109.0	111.0	109.0
8	108.0	109.0	109.0	108.0
9	109.0	106.0	109.0	108.0
10	108.0	106.0	110.0	109.0

Number of Jumper 23

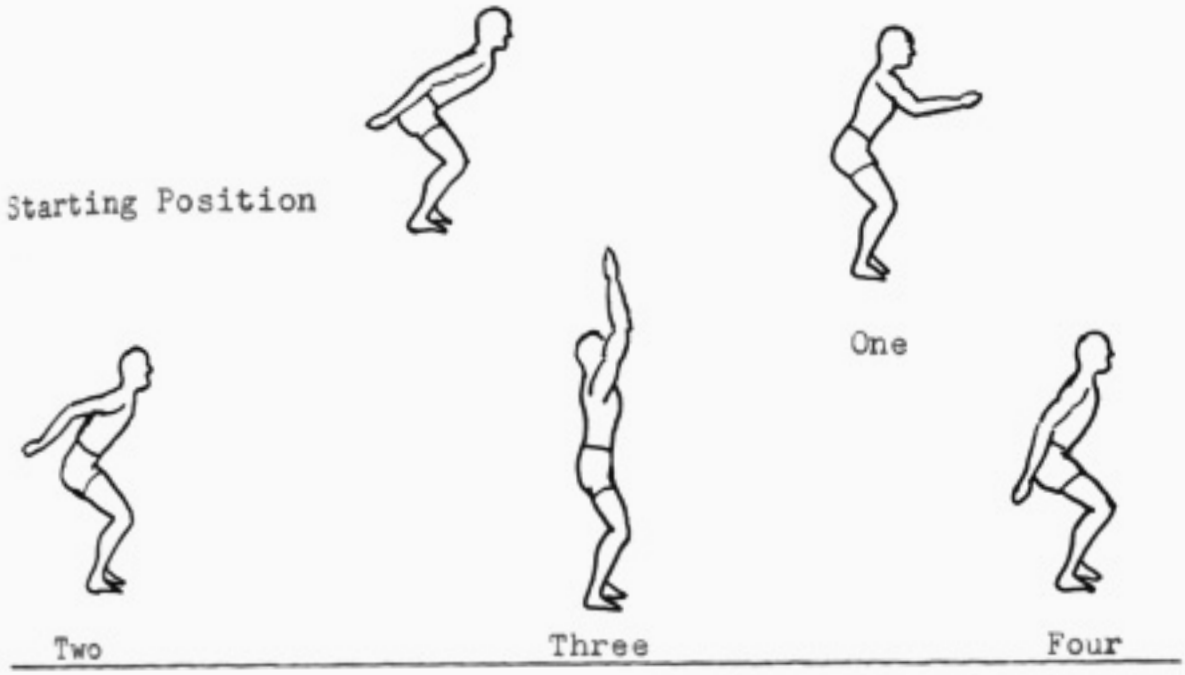
Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	108.0	109.0	111.0	109.0
2	109.0	109.0	110.5	108.0
3	109.0	109.0	111.0	109.5
4	108.0	109.0	110.0	110.0
5	109.0	110.0	110.0	109.0
6	108.0	109.0	111.5	108.0
7	108.0	109.0	111.0	109.0
8	108.0	108.0	111.0	111.0
9	108.0	109.0	110.0	110.0
10	108.0	108.0	111.0	110.0

Number of Jumper 24

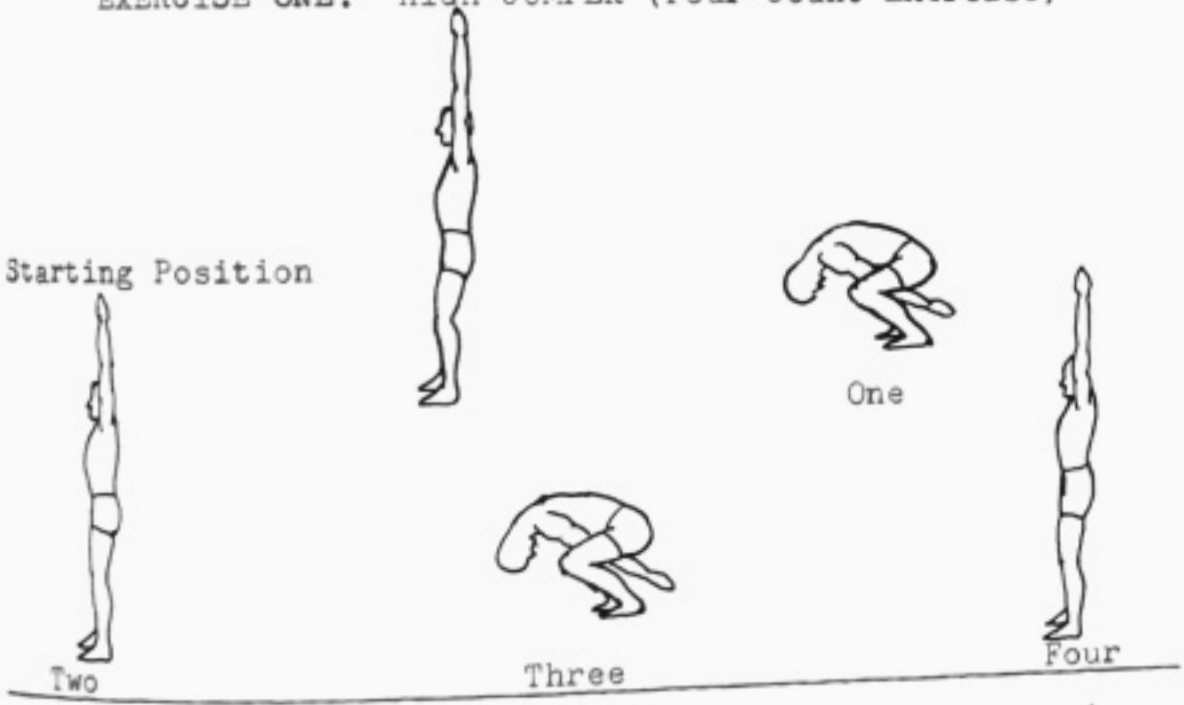
Jump No.	Initial Jumps		Sixth Jumps	
	R	L	R	L
1	103.0	103.0	105.5	104.0
2	105.0	103.5	106.0	103.0
3	104.0	102.5	105.0	103.5
4	103.0	102.0	106.0	104.0
5	103.0	101.0	105.0	103.0
6	102.0	101.5	104.5	103.5
7	102.0	105.0	105.0	104.0
8	103.0	104.0	105.0	104.5
9	103.0	104.5	104.5	105.0
10	103.5	106.0	104.5	104.0

APPENDIX C

THE EXERCISES OF THE ARMY DOZEN



EXERCISE ONE: HIGH JUMPER (Four-Count Exercise)



EXERCISE TWO: BEND AND REACH (Four-Count Exercise)

ARMY DOZEN EXERCISES (continued)

Starting Position

One

Two

Three

Four

EXERCISE THREE: SQUAT THRUST (Four-Count Exercise)

Starting Position

One

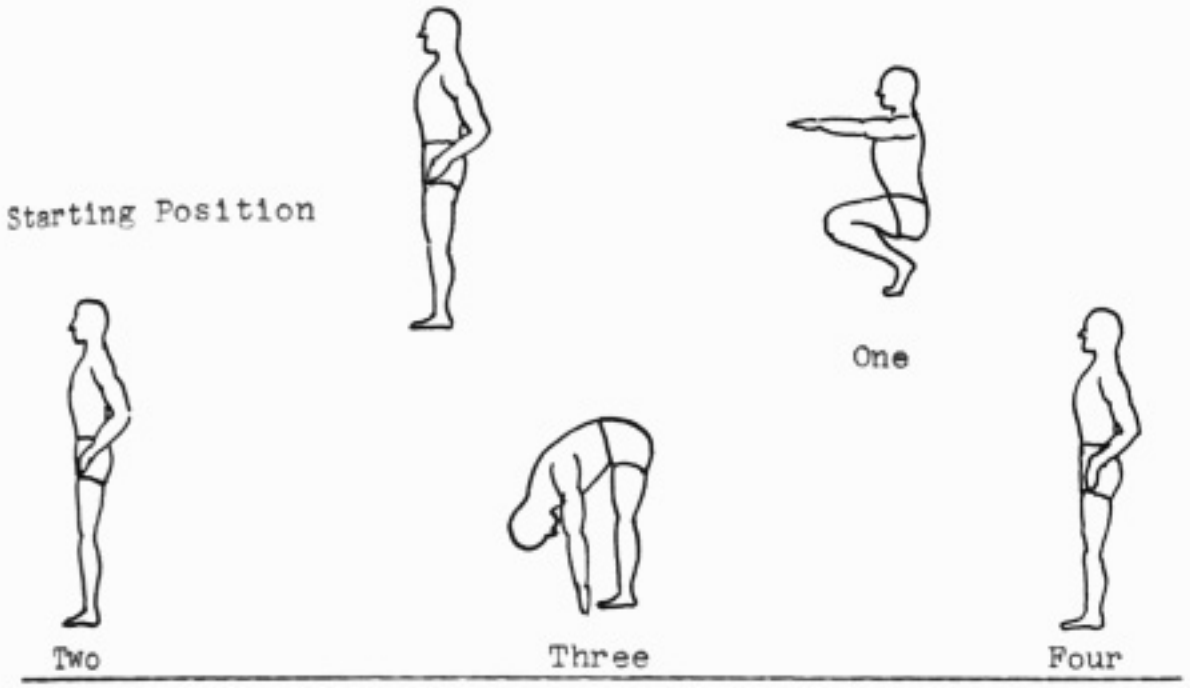
Two

Three

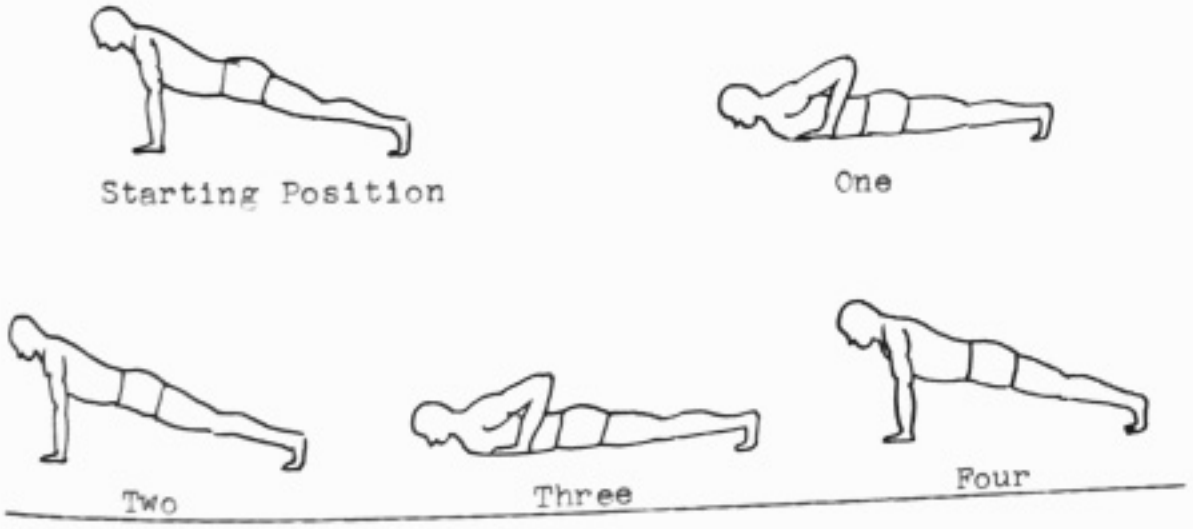
Four

EXERCISE FOUR: ROWING EXERCISE (Four-Count Exercise)

ARMY DOZEN EXERCISES (continued)

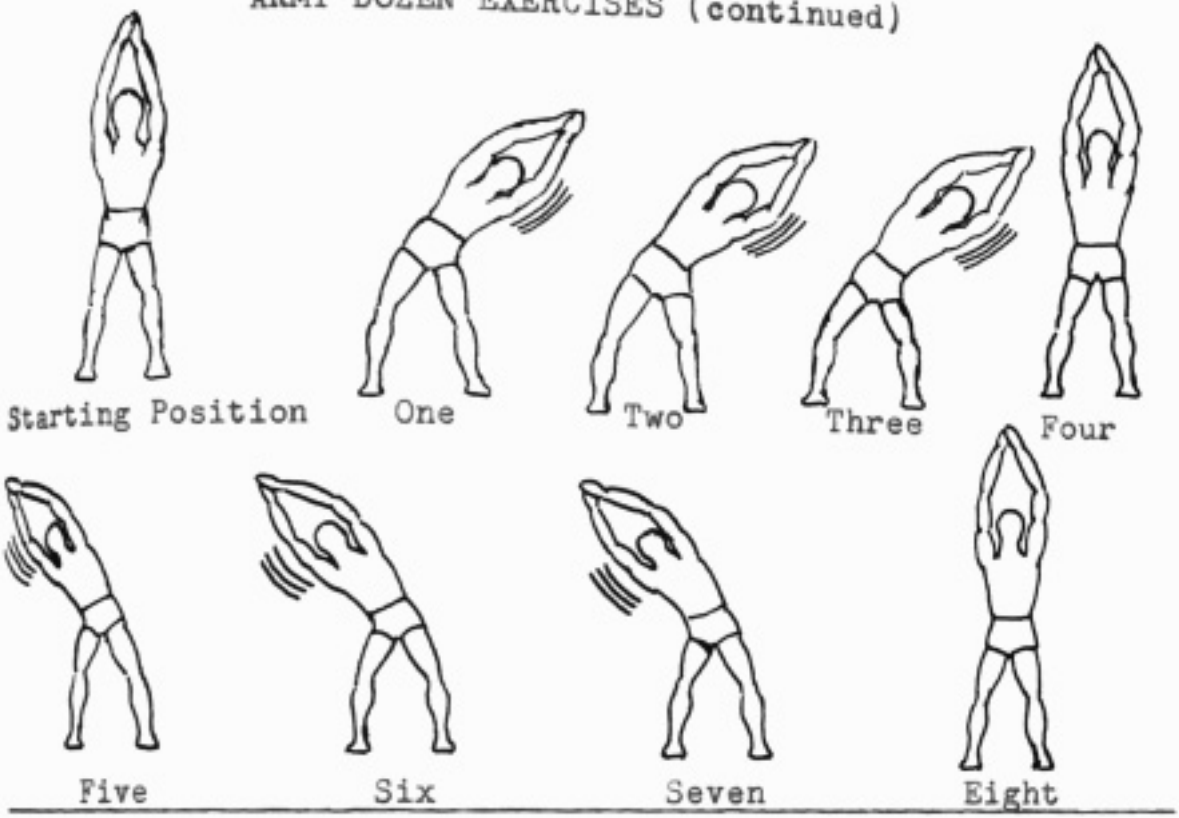


EXERCISE FIVE: SQUAT BENDER (Four-Count Exercise)

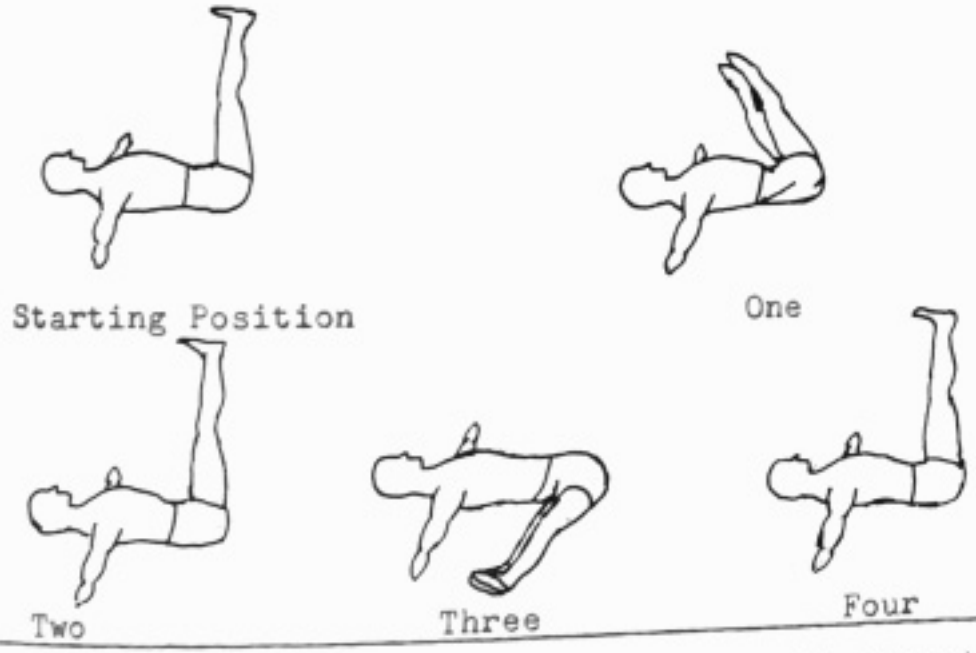


EXERCIES SIX: PUSHUPS (Four Count Exercise)

ARMY DOZEN EXERCISES (continued)

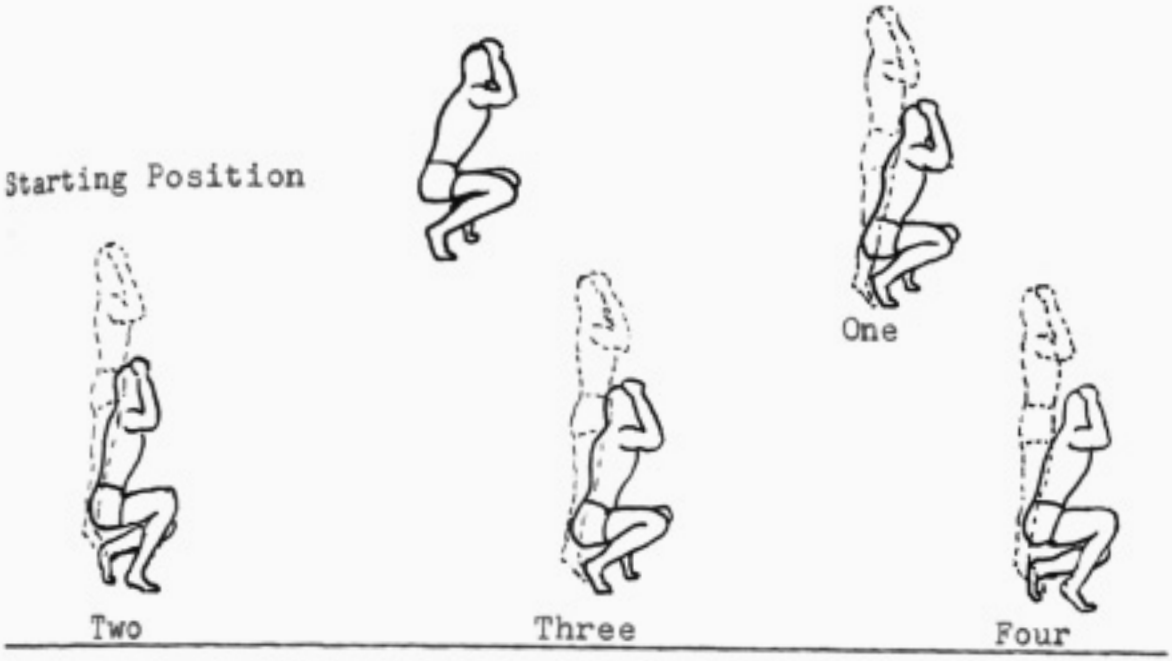


EXERCISE SEVEN: SIDE BENDER (Eight-Count Exercise)

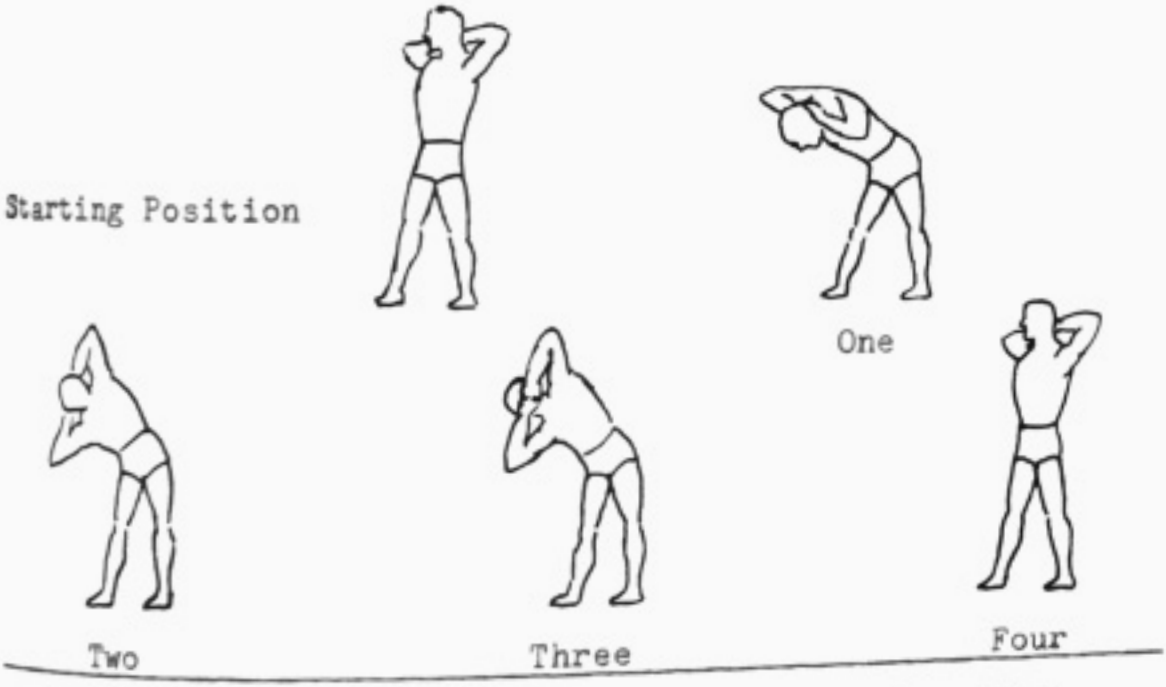


EXERCISE EIGHT: BODY TWIST (Four-Count Exercise)

ARMY DOZEN EXERCISES (continued)



EXERCISE NINE: SQUAT JUMPER (Four-Count Exercise)



EXERCISE TEN: TRUNK TWISTER (Four-Count Exercise)

ARMY DOZEN EXERCISES (continued)

Starting Position

One

Two

EXERCISE ELEVEN: STATIONARY RUN (Two-Count Exercise)

Starting Position

One

Two

Three

Four

Five

Six

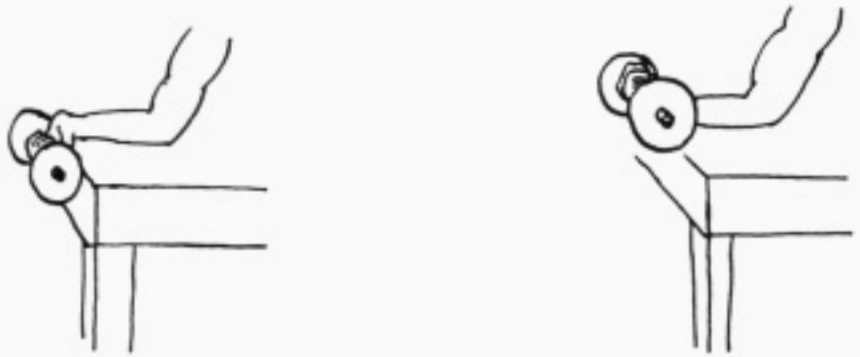
Seven

Eight

EXERCISE TWELVE: EIGHT-COUNT PUSHUP (Eight-Count Exercise)

APPENDIX D

THE EXERCISES OF THE IOWA WEIGHT PROGRAM



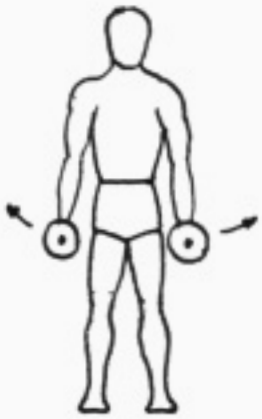
One Two

EXERCISE ONE: FINGER AND WRIST CURLS

One Two

EXERCISE TWO: FOREARM CURLS

WEIGHT EXERCISES (continued)



One

Two

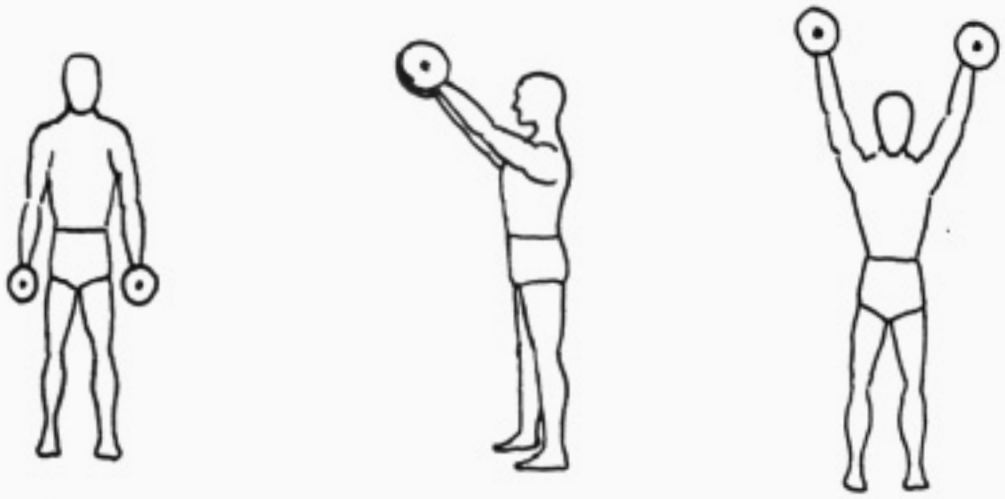
EXERCISE THREE: SIDEWARD RAISE

One

Two

EXERCISE FOUR: OVERHEAD EXTENSION (PRESS)

WEIGHT EXERCISES (continued)



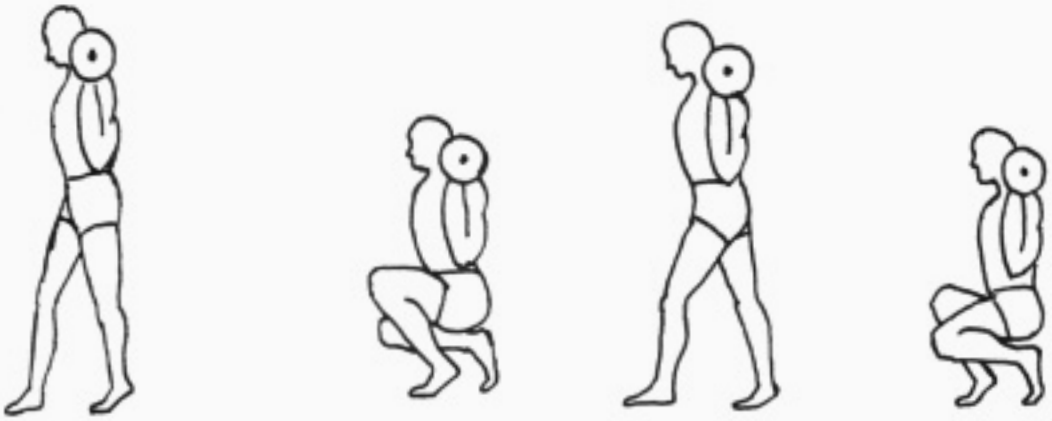
One Two Three

EXERCISE FIVE: FORWARD RAISE

One Two

EXERCISE SIX: HEEL RAISE

WEIGHT EXERCISES (continued)



One Two Three Four

EXERCISE SEVEN: WALKING SQUAT